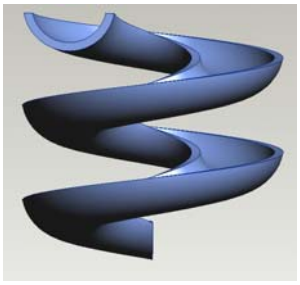
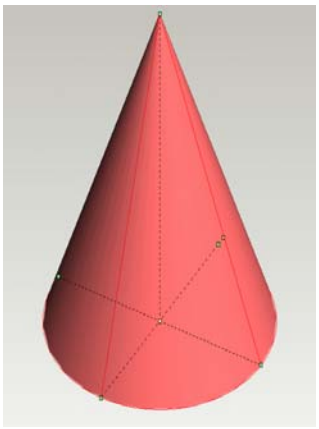
3-D Solid Modeling and Design

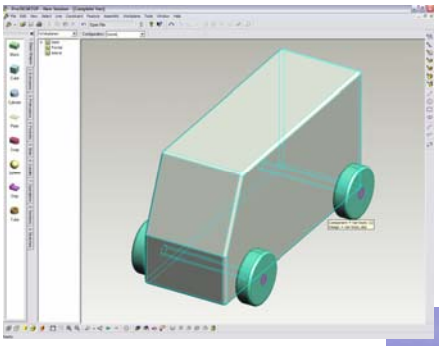
Student Learning Activities for

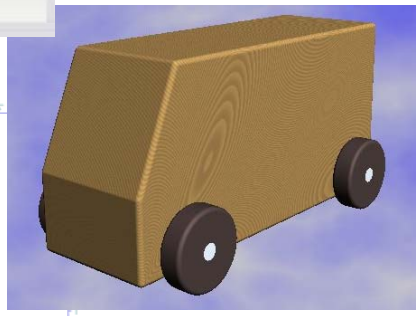
Activity #10

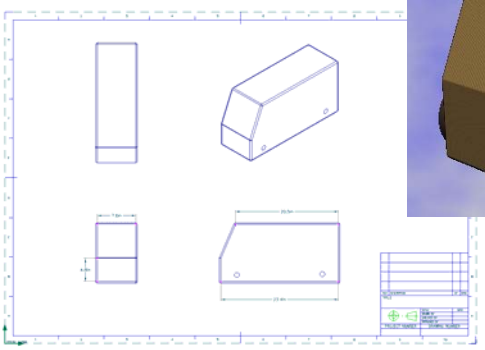
PTC Pro/DESKTOP® 8.0

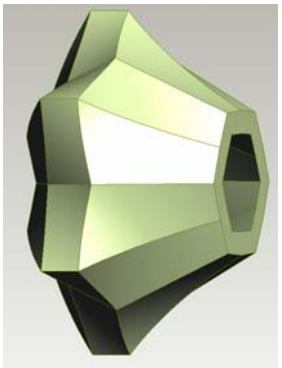












Activity 10:

Mirrors and Duplicate

(Flesch-Kincaid readability level = 7.6)

About the program

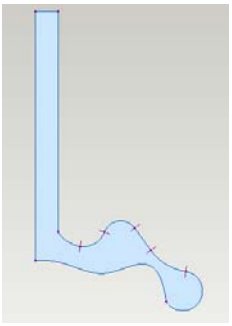
Pro/Desktop (called 'PD' from now on) is a powerful software program that allows you to sketch ideas first, and then work on design details later.

This activity will help you:

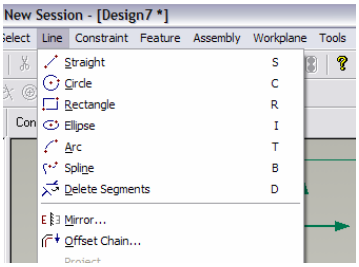
- Learn to use the Mirror command
- Learn to use the Duplicate command

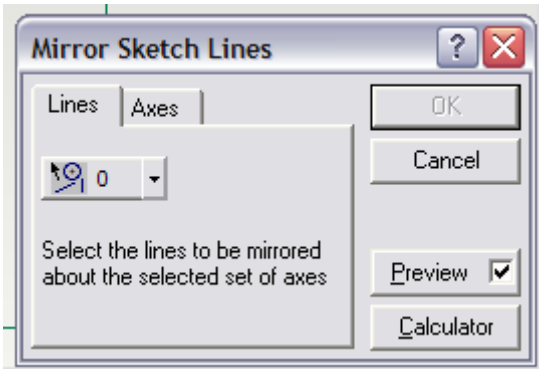
Mirror

If you need to make a **symmetrical** (same on both sides) design, but it is too detailed to make two halves exactly the same, you can use the **Mirror** command in the **Line** pull-down menu. Watch this: Here is what half of the profile for a detailed racing wheel may look like. Desing something close to this 8" tall, 4" wide profile in a new sketch using **Line** and **Arc** commands. →



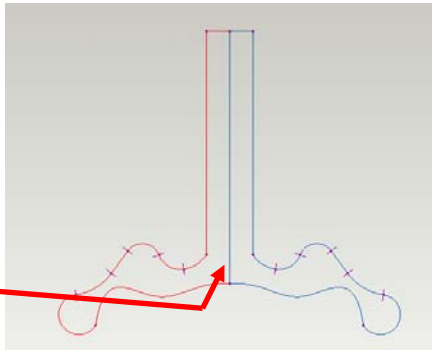
It may be almost impossible to re-create exactly the other half of the wheel. To save time and frustration, click on the **Line** pull-down menu, then on **Mirror:** →



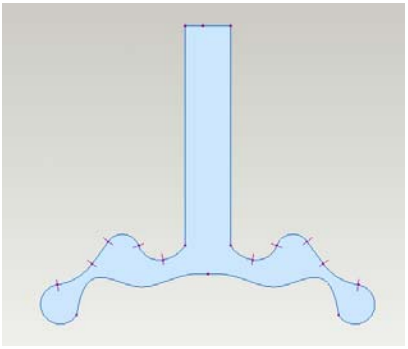


In the dialog box that appears, there will be 2 tabs to select lines. One is for the Profile **Lines** and one is for the **Axes**. Click on the 'Lines' tab. Make sure the Preview box is checked. **Click and drag a window around all lines you want mirrored**. The profile lines to be mirrored will turn active (**red**).

Now click on the **Axes** tab in the dialogue box. Click on the left straight line in your profile. Your preview will show a mirror of all existing profile lines. If the preview appears correct, click OK. Why is the profile not active? You will need to delete any Axes between the two halves so that the profile is not intersected by any inside lines.



You may have to move the design slightly, or click the Update icon to get it to turn active.

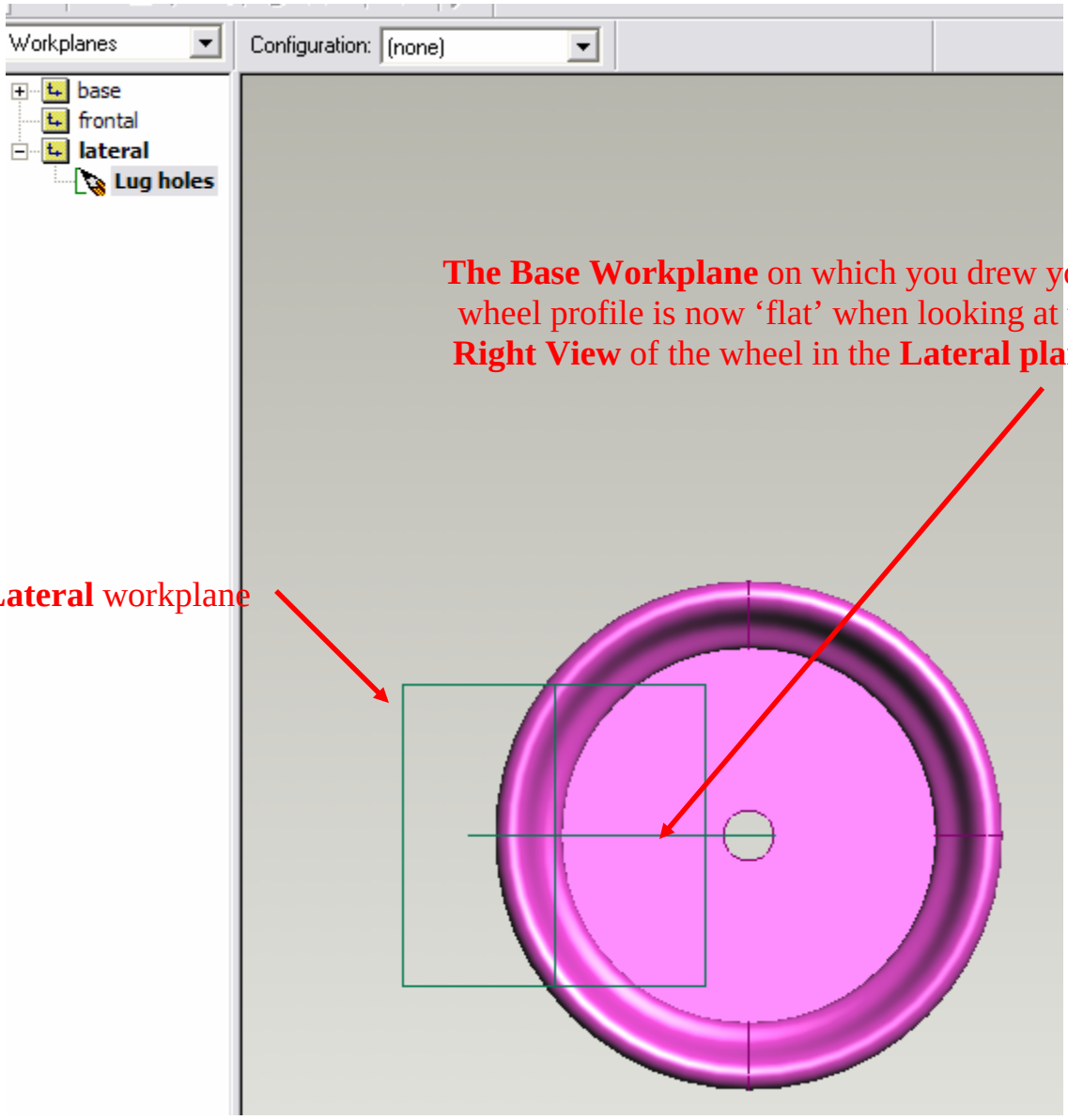


Now, place a horizontal construction line approximately ½" above the top and Revolve the profile 360 degrees, adding material above the workplane. Create an album photo and change the material to machined aluminum.

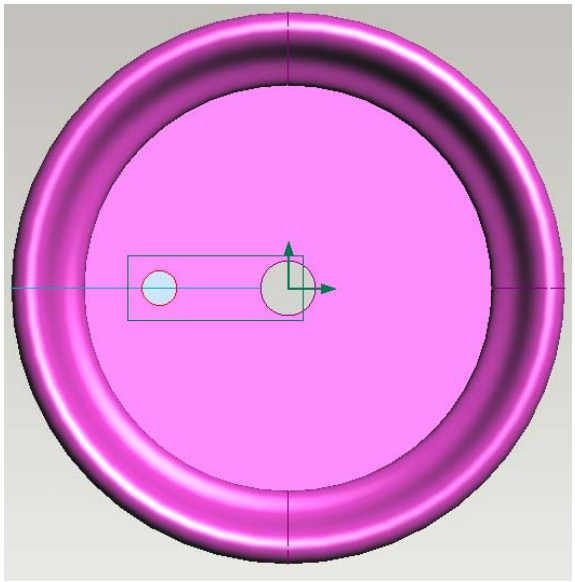
SAVE your design **AND** your album photo according to your instructor's directions.

Duplicate

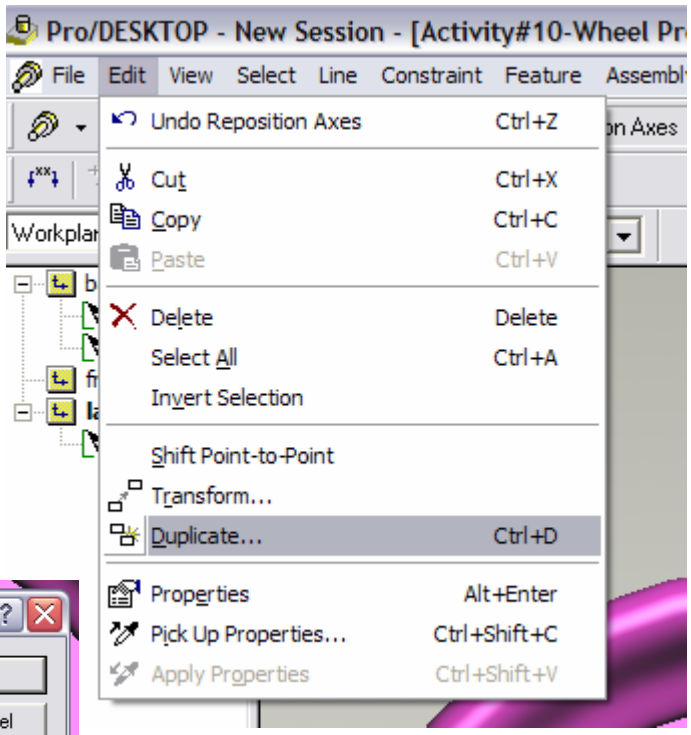
Open your wheel design (not album photo) if it is not already open. Rotate the view to the Right View (from the Views icon in the in the Views Toolbar).
In the Object Browser Pane, change to the **Lateral** workplane by clicking on that workplane and create a new sketch. Name the new sketch 'Lug Holes'.

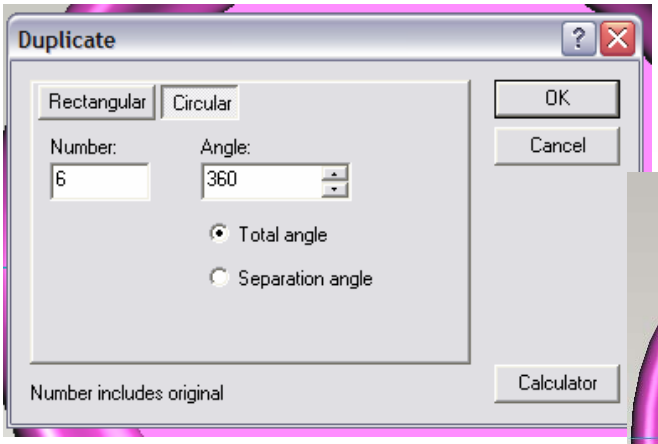


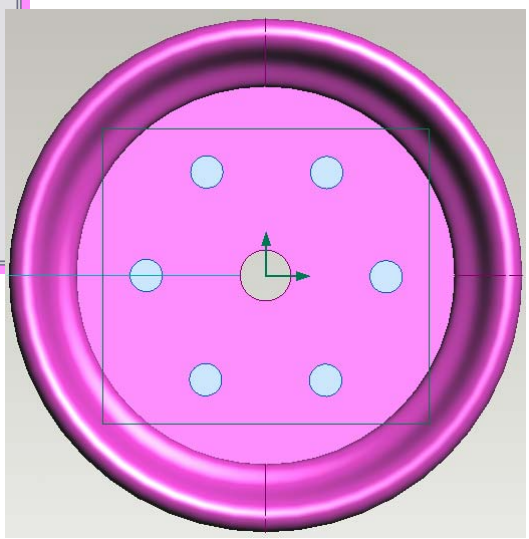
While in the Lateral plane, draw a small circle centered on the Base Workplane line between the hole and the edge of the wheel. Reposition the axes so they are in the center of the existing hole (you may have to go by your Snap grid measurements or zoom in close up to place the axes in the center of the hole)→.



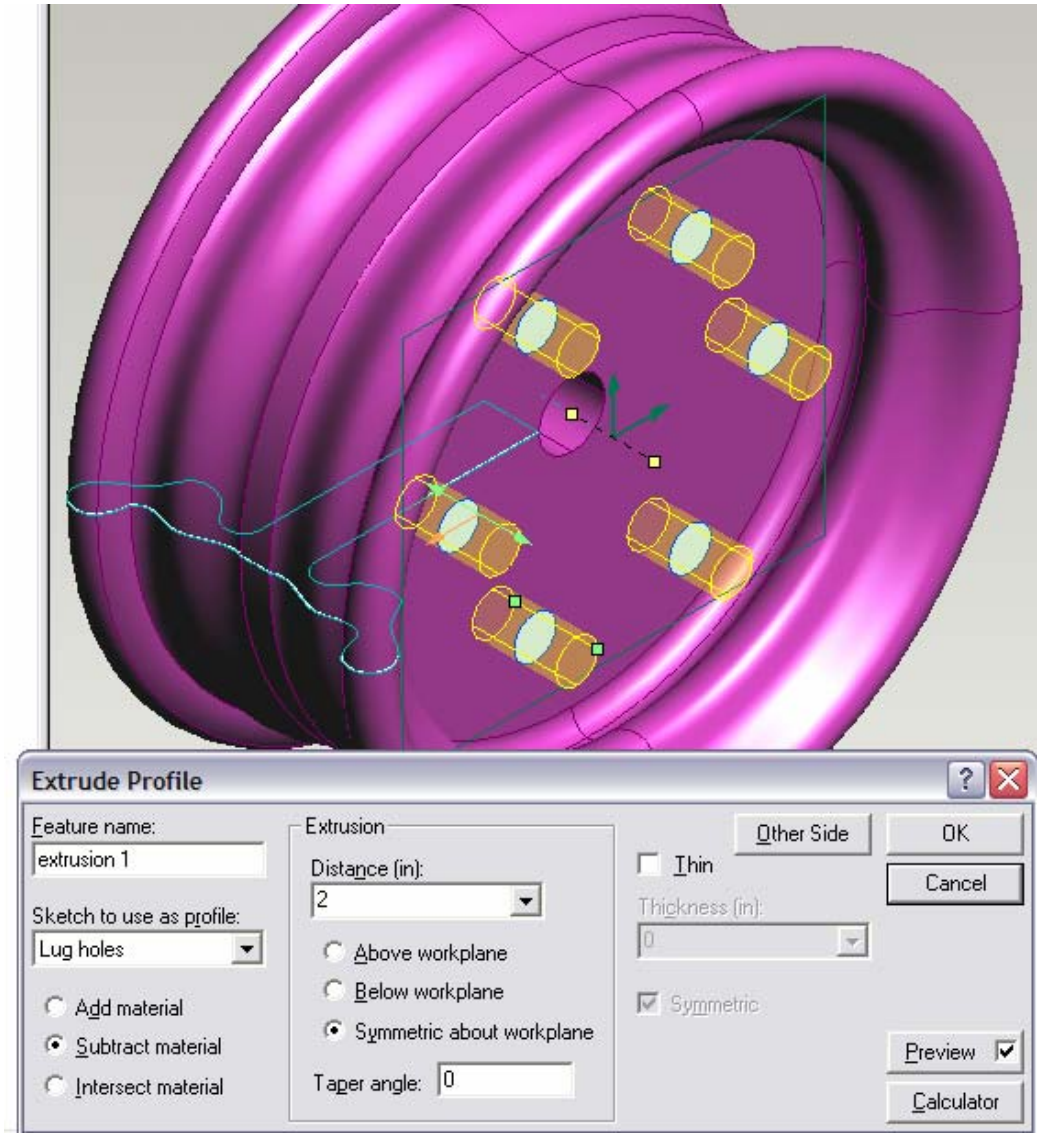
Make sure the small circle on the **Lug Holes** workplane is active (**red**). In the **Edit** pull-down menu, select '**Duplicate**'. Click on the 'Circular' tab and select a number of lug holes that you feel the wheel should have (4 to 8). Notice that the number you enter will automatically add the first hole you drew. Leave the angle at 360°. Click OK







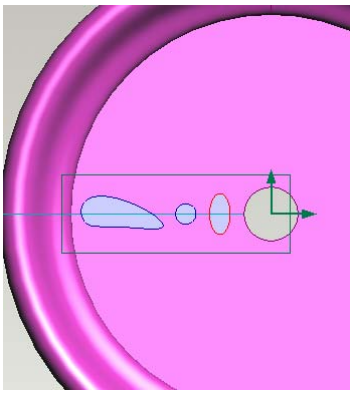
Change back to the isometric view. Select all the holes in the Lug Holes sketch by dragging a window around them. Click the **Extrude** icon. Enter the values the same as the dialogue box on the next page (you may have to 'Undo' and enter a Distance value larger than 2", depending on how thick your wheel center is). Click OK when ready.



Return to the workplane view & see how you have quickly and accurately duplicated an **array** (equally-spaced series) of circles where the wheel lugs would be on this wheel.

SAVE your design according to your instructor's directions.

You can also try to insert additional profiles in the 'Lug Holes' sketch to 'dress up' your wheel design. Look at some of the profiles and their extruded patterns on the next page:



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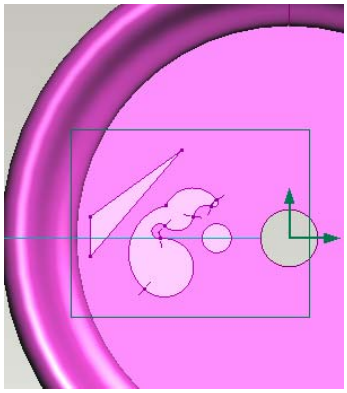

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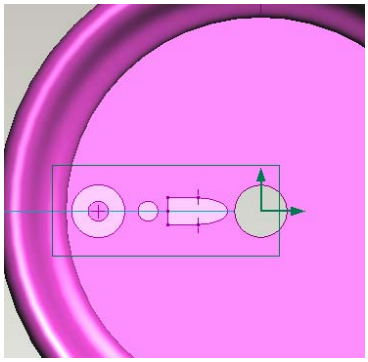

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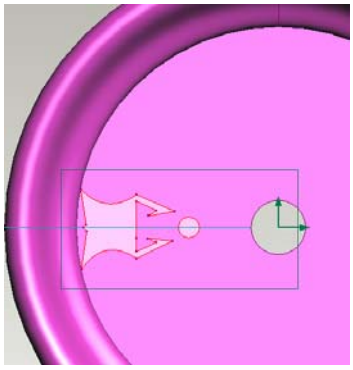

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You have completed this activity using PD! Please exit the program.